

## Smart Workplace

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### ABSTRACT

The “smart workplace” is said to be a strategy to improve the working environment in a company or organization, to designate the new ways of organizing work, linked to the development of telecommuting and the hybrid office. The smart workplace concept is part of the more global notion of the “modern workplace.” This forms a dynamic and supportive environment that aims to make the most of human capital in a quickly evolving world of work, responding to a global trend towards increased mobility and flexibility. During the pandemic, this has been present but the trend is now accelerating and has even opened the way to new hybrid modes of work. In general, a smart workplace or intelligent workplace makes use of technology to connect and engage employees with their work environment, whatever it may be (on-site or remote work). In this case, workplaces are adapted to new ways of working by the use of technology and in particular digital tools. This paper presents the challenges, solutions, and benefits of smart workplace.

**KEYWORDS:** *Smart workplace, mobility and flexibility, Internet of things (IoT), telecommuting, hybrid office, Workplace 3.0, artificial intelligence (AI), hot desking*

### INTRODUCTION

An office is a space where the employees of an organization perform administrative work so as to support and realize organizational goals. The word “office” may also denote or mean a position within an organization with specific duties attached to it (e.g. officer or official); an office may also be small, or may occupy the entire floors of buildings, or even massive buildings dedicated entirely to a company, as shown in Figure 1. However, in modern terms, an office is usually the location where white-collar workers carry out their functions [1].

The smart workplace is also known as the “modern workplace” to designate the new ways of organizing work, which is linked to the development of telecommuting and the hybrid office. The modern workplace is in response to the global trend towards increased mobility and flexibility, as witnessed during the Covid-19 pandemic, opening the way to new hybrid modes of work, as shown in Figure 2. The modern workplace includes the concepts of the hybrid workplace, the digital workplace, the virtual workplace, and the smart workplace [2]. It is an office space that uses technology to improve productivity,

collaboration, and the employee experience, as shown in Figure 3.

### HISTORY

The word “office” is from the Latin “officium” and its equivalents in various Romance languages, which referred to human staff members of an organization, or even the abstract notion of a formal position like a magistrate. In classical antiquity, offices were often part of a palace complex or a large temple, often with room where scrolls were kept and scribes did their work. These rooms are sometimes called “libraries” by some archaeologists because of scroll’s association with literature [1].

### Middle ages:

The High Middle Ages (1000-1300) saw the rise of the medieval chancery, as the place where most government letters were written and laws were copied within a kingdom. The rooms of the chancery often had walls full of pigeonholes, constructed to hold rolled-up pieces of parchment for safekeeping or ready reference, which was a precursor to the modern bookshelf. The introduction of the printing press

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during the Renaissance did not impact the setup and function of these government offices significantly [1]. Medieval paintings and tapestries often show people in their private offices handling record-keeping books or writing on scrolls of parchment. Before the invention of the printing press and its wider distribution, there was often no clear cultural distinction between a private office and a private library.

It was in the 13<sup>th</sup> century that the English word “office” first appeared when referring to a position involving specific professional duties (e. g “the office of the....”), and was first used by Geoffrey Chaucer in 1395 to mean a place where business is transacted in *The Canterbury Tales* [1].

As mercantilism became the dominant economic theory of the Renaissance, merchants conducted their businesses in buildings that also sometimes housed people doing rental sales, warehousing, and clerical work. During the 15<sup>th</sup> century, the population density in many cities reached a point where merchants began to use stand-alone buildings to conduct their businesses. A distinction began to develop between religious, administrative/military, and commercial uses for buildings [1, 3].

#### **Emergence of the modern office:**

It was in the 18<sup>th</sup> century that the first purpose-built office spaces were constructed to suit the needs of large and growing organizations such as the Royal Navy and the East India Company. The Old Admiralty (Ripley Building) was built in 1726 and was the first purpose-built office building in Great Britain. Apart from offices, the building also housed a board room and apartments for the Lords of the Admiralty. In the 1770s, many scattered offices for the Royal Navy were gathered into Somerset House, the first block purpose-built for office work [1].

The East India House was built in 1729 on Leadenhall Street in the City of London as the headquarters from which the East India Company administered its Indian colonial possessions/interests. A complex bureaucracy was developed by the company which necessitated that the thousands of the office employees were required to process paperwork. The company also recognized the benefits of centralized administration and required that all workers sign in and out at the central office each day [4, 5].

During the 18<sup>th</sup> and 19<sup>th</sup> centuries, the Industrial Revolution intensified, such that the industries of banking, rail, insurance, retail, petroleum, and telegraphy dramatically grew in size and complexity. This led to the large increase in number of clerks that

were needed to handle order processing, accounting, and document filing, and with the need to house them in specialized spaces. Most of the desks of those era were top-heavy and had a cubicle-like appearance, with paper storage bins extending above the deskwork area, offering workers some degree of privacy [1]. The very high price of land in the central core cities led to the first multi-storey buildings, which were limited to about 10 stories until the use of iron and steel allowed for higher structures. The first purpose-built office block was the Brunswick Building, built in Liverpool in 1841 [1]. In 1852, the invention of the safety elevator by Elisha Otis brought about the rapid upward escalation of buildings [3]. By the end of the 19<sup>th</sup> century, larger office buildings frequently contained large glass atriums to allow light into the complex and improve air circulation.

#### **The 20<sup>th</sup> century:**

Many factors are known that gave rise to the modern offices of the early 20<sup>th</sup> century, amongst which are: the links between finance and work efficiency; the invention of electric lighting, allowing employees to work without expensive gas lighting or many windows; typewriters and calculation machines, for processing vast amounts of information; communication devices such as telegraph and telephone, which allowed for office buildings to be located away from factories, homes, and even countries of operation, but with control being maintained over them [5]. Expensive land prices, the inventions of the lift and of steel frame construction made it possible for buildings higher than 10 storeys – which gave rise to the skyscrapers of 20<sup>th</sup> century Chicago and New York, and that of the Wainwright Building in St. Louis, Missouri [5]. As a result of this, there have been rapid evolution of office design which can accommodate larger number of workforces in spacious, open plan offices, working in natural light or under electric lighting. In these offices have put in place soundproofing and partitioning, which isolated employees from excessive noise, heat, or pollution, as shown in Figure 4.

By 1906, Sears, Roebuck, and Co. had their headquarters operation in a 3,000,000-square-foot (280,000 m<sup>2</sup>) building in Chicago, the largest building at the time in the world [1]. F. W. Taylor, known as the father of scientific management, a proponent of the Efficiency Movement, was an advocate for the use of large, open floor plans and desks that faced supervisors, to allow for managers and supervisors to scrutinize workers with some ease [5, 6]. Frank Lloyd Wright was said to have developed the first commercially-viable Taylorist office – for a mail order soap company in 1904 and he designed the first

ever “system” furniture – desks sporting built-in cabinets and dividers to keep employees focused and worktops tidy [5].

### THE VIRTUAL OFFICE

The 1990s saw greater developments with the increase in the ease of internet access. This brought about not only a wealth of funny pictures, Geocities websites and the beginnings of social networking, but it also had groundbreaking effects on office working that cannot be ignored. The World Wide Web (WWW) brought with it the development of an office phenomenon first seen at the turn of the 20<sup>th</sup> century: widespread new technology – the internet, laptops and mobile phones, which has moved offices, workers and work away from the office and desk, and onto public transport, into homes and cafes [5], as shown in Figures 5, 6, and 7. The emergence of virtual offices among others were facilitated by: 1. The early recession of the 1990s, combined with growing competition in increasingly globalised markets, which had a squeeze on many businesses (while cost savings via teleworking and outsourcing facilitated by advanced telecommunications was seen as a way out by business leaders) and; 2. The growing land prices and ground rents in urban areas saw many multinational companies relocating out of city centres to industrial parks and underused land accessible only by small train stations and motorways [5].

Covid-19 has actually brought about a rethink on the use of the office by both large and small businesses, which home-working experiment has brought about the emergence of Workplace 3.0. The workplace of the future recognizes that if people can work productively at home, then the office needs fewer desks and more agile work settings, as shown in Figure 8. People choose where they work, that is whether at home or which part of the workplace depending on their specific tasks. Workplace 3.0 is a balanced workplace which reflects organizations’ environmental, social and corporate governance approach (ESG). Its three key themes are [5]: wellbeing, sustainability and technology.

**Wellbeing:** Wellbeing in Workplace 3.0 is to make staff feel valued and not only save money by boosting productivity and reducing absence from work, thereby producing a far more effective, cohesive and well motivated workforce.

**Sustainability:** The UK government is committed to zero carbon emission by 2050, which is now high on the corporate agenda, since a large percentage of UK carbon is coming from buildings, hence the need for substantial changes to the built environment. For this reason, organizations apart from meeting their environmental commitments, must as well attract the

next generation of talent which are often heavily focused on environmental issues. Organizations must now focus on reducing operational carbon in Workplace 3.0, and also on ensuring that any building improvements are as low as possible in embodied carbon.

**Technology:** With the experiences during the period of Covid-19, it showed that it is possible to work anywhere and this has greatly increased people’s expectations of their workplace technology. Workplace 3.0 is stocked with technology designed to deliver a seamless, touch-free experience both in the office and to enable working from home. From entry to exit, a variety of apps and solutions help to guide employees and visitors through a building safely and quickly. Technology, such as workplace-focused apps, security passes, tablets, AI, booking software, and video conferencing, create a frictionless and personalized journey through the workplace that can be shaped around each individual’s unique needs and preferences.

### ARTIFICIAL INTELLIGENCE IN THE WORKPLACE

Businesses are now looking to support the employees by incorporating AI-driven systems into the office, it is unclear to what extent this could impact workers, but could range from virtual assistants, to analyzing employee behaviors to optimize environmental conditions like lighting, temperature and acoustics – the possibilities are just endless. The most important and basic elements of a company success lie in employee cultivation – which starts with the blueprints and evolution of the humble office space [5].

### BENEFITS OF SMART OFFICES

As technology used in smart offices enables people to work better, faster and, of course smarter, and coupled with beacons, sensors and mobile apps, making people to also communicate better. Sensors can tell if a person is in a building, where exactly they are at any given moment and even if a certain conference room is booked and for how long. Smart offices are also called the offices of the future. Some of the benefits of smart offices for sustainable growth of a company include [7]:

1. Boosting productivity
2. Easier employee and office schedule management
3. Better cost control
4. Insightful usage analytics
5. Leverage of cloud computing
6. Developing a smart brand
7. Improved and unified communication
8. Creation of a better working environment
9. Time saving



10. Employee attraction and retention
11. Identity management.

## CHALLENGES FROM SMART OFFICE SYSTEMS

There are always challenges to changes in organizations or when transitioning to smart office setups which are surmountable. Example are [7]:

1. Use existing capabilities to transition to a smart workplace
2. Monitor the right behavior to keep your company safe
3. Incorporate hot desking apps

Advantages of incorporating hot desking apps:

1. Cost effectiveness
2. Improves relationships and communication between workers
3. Own and accept your work environment
4. Acquisition of new skills
5. Employee flexibility

## CONCLUSION

A smart workplace leverages advanced technology to help create a more efficient, flexible, and employee-centric work environment, enhancing productivity, collaboration, and overall wellbeing through the integration of features like automated systems, data analytics, and connected devices. This makes businesses to adapt to changing work styles and to optimize resource utilization while fostering a positive employee experience, making it a crucial element for future-proofing business operations and attracting top talent. Organizations need to leverage on tools like IoT sensors, collaboration platforms, and AI-powered analytics to revolutionize their workspaces to meet the evolving demands for a hybrid workforce – a necessity for businesses that want to thrive in the future. Businesses must also embrace the future of work through streamlining visitor management, enhancing security, and ensuring

data privacy compliance. More information on smart workplace can be found in [8, 9].

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**Figure 1. Deloitte**

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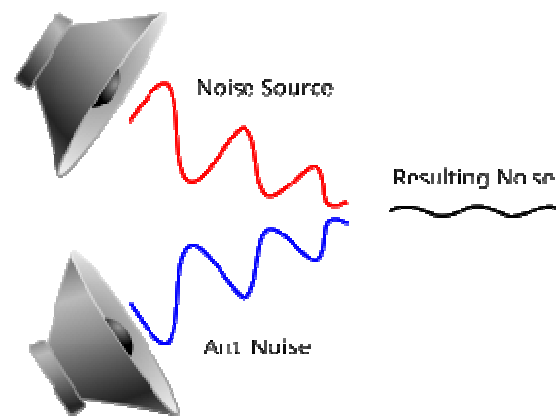
**Figure 2. Small office/home**

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**Figure 3. Smart communications**

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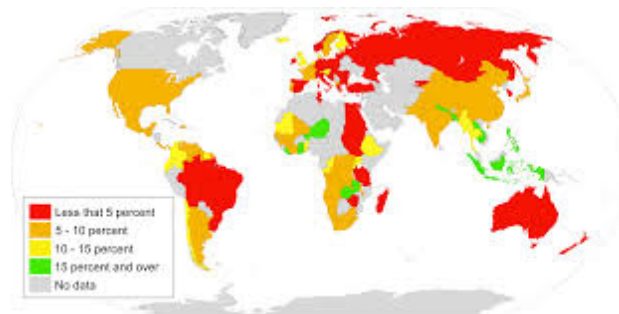
**Figure 4. Active noise control**

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**Figure 5. Remote work**

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**Figure 6. Remote work**

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**Figure 7. Technology**

Source:[https://www.google.com/search?sca\\_esv=a576ccb47457794e&sxsrf=AHTn8zqe0UJsN5TedOrRQ8EbHXL3H332Iw:1740264288811&q=IMAGES+ON+SMART+WORKPLACE+BY+WIKIPEDIA&udm=2&fbs=ABzOT\\_CWdhQLP1FcmU5B0fn3xuWpA-dk4wpBWOGoR7DG5zJBjLjqIC1CYKD9D-DQAQS3Z5NmlRTZM9mMZwadeXOSzfMOuJ9MVOHDHVayNtOyOCEREm3RXZuZWpCKSNf1HgZ9GY\\_3s6mbwIMPgr4rsBKOTxrDRbh7ZTQllzMsxzAahWmrrBeh2A4\\_7NFFIJVSECdlabxCH&sa=X&ved=2ahUKEwj7xf\\_VrdiLaxUNQEEAHcrSNcEQtKgLegQIExAB&biw=1036&bih=539&dpr=1#vhid=\\_7gZhmiD4gFtvM&vssid=mosaic](https://www.google.com/search?sca_esv=a576ccb47457794e&sxsrf=AHTn8zqe0UJsN5TedOrRQ8EbHXL3H332Iw:1740264288811&q=IMAGES+ON+SMART+WORKPLACE+BY+WIKIPEDIA&udm=2&fbs=ABzOT_CWdhQLP1FcmU5B0fn3xuWpA-dk4wpBWOGoR7DG5zJBjLjqIC1CYKD9D-DQAQS3Z5NmlRTZM9mMZwadeXOSzfMOuJ9MVOHDHVayNtOyOCEREm3RXZuZWpCKSNf1HgZ9GY_3s6mbwIMPgr4rsBKOTxrDRbh7ZTQllzMsxzAahWmrrBeh2A4_7NFFIJVSECdlabxCH&sa=X&ved=2ahUKEwj7xf_VrdiLaxUNQEEAHcrSNcEQtKgLegQIExAB&biw=1036&bih=539&dpr=1#vhid=_7gZhmiD4gFtvM&vssid=mosaic)



**Figure 8. Lavoro agile**

Source:[https://www.google.com/search?sca\\_esv=a576ccb47457794e&sxsrf=AHTn8zqe0UJsN5TedOrRQ8EbHXL3H332Iw:1740264288811&q=IMAGES+ON+SMART+WORKPLACE+BY+WIKIPEDIA&udm=2&fbs=ABzOT\\_CWdhQLP1FcmU5B0fn3xuWpA-dk4wpBWOGoR7DG5zJBjLjqIC1CYKD9D-DQAQS3Z5NmlRTZM9mMZwadeXOSzfMOuJ9MVOHDHVayNtOyOCEREm3RXZuZWpCKSNf1HgZ9GY\\_3s6mbwIMPgr4rsBKOTxrDRbh7ZTQllzMsxzAahWmrrBeh2A4\\_7NFFIJVSECdlabxCH&sa=X&ved=2ahUKEwj7xf\\_VrdiLaxUNQEEAHcrSNcEQtKgLegQIExAB&biw=1036&bih=539&dpr=1#vhid=T31-AyWx7k37gM&vssid=mosaic](https://www.google.com/search?sca_esv=a576ccb47457794e&sxsrf=AHTn8zqe0UJsN5TedOrRQ8EbHXL3H332Iw:1740264288811&q=IMAGES+ON+SMART+WORKPLACE+BY+WIKIPEDIA&udm=2&fbs=ABzOT_CWdhQLP1FcmU5B0fn3xuWpA-dk4wpBWOGoR7DG5zJBjLjqIC1CYKD9D-DQAQS3Z5NmlRTZM9mMZwadeXOSzfMOuJ9MVOHDHVayNtOyOCEREm3RXZuZWpCKSNf1HgZ9GY_3s6mbwIMPgr4rsBKOTxrDRbh7ZTQllzMsxzAahWmrrBeh2A4_7NFFIJVSECdlabxCH&sa=X&ved=2ahUKEwj7xf_VrdiLaxUNQEEAHcrSNcEQtKgLegQIExAB&biw=1036&bih=539&dpr=1#vhid=T31-AyWx7k37gM&vssid=mosaic)